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## TRANSLATIONS.

### SOME EXPERIMENTS CONCERNING THE LYMPH VESSELS OF THE EYE AND THE ORBIT.\*

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Translated by A. Alt, M.D.

The lymphatic circulation as established by Leber's works has of late been seriously shaken. Hamburger's researches especially have shown that the aqueous humor is in the main secreted by the anterior surface of the iris. The elimination of this fluid, according to Hamburger, takes place by extremely slow diffusion through the walls of the veins of the iris, the canal of Schlemm, and from there into the anterior ciliary veins. In a recent paper Hamburger<sup>1</sup> even no longer recognizes the latter route and vouchsafes to the iris veins alone the role of absorbing the aqueous humor. In 1911 Weiss<sup>2</sup> published a paper in which he proves that the tension in the interior of the veins is considerably higher than the intraocular tension; therefore, no transudation can take place into Schlemm's canal or the other veins.

The experiments which I have made have convinced me that there is in the eye and in the orbit a lymphatic system for the outflow of the aqueous humor and completely independent of the venous system.

The following experiments were made:

I made a great many injections into the anterior chamber and the vitreous body of rabbits. The injections into the anterior

\*Preliminary notes of a paper which will appear in the Archives de Biologie.—Bulletin de la Société Belge d'Ophtalmologie, April 27th, 1913.

chamber were made by introducing the needle of a Pravatz syringe 2 mm. behind the limbus and by passing it just behind the iris into the pupil. In this manner no aqueous humor escapes.

The substances which I injected were watery solutions of crystalloids and colloids which could be found in the sections by means of precipitation; then olive oil, which was found by fixing the pieces in osmic acid; finally, solid bodies in suspension, like China ink, the carminate of lead, colloidal silver and gold leaf.

These experiments were brought to end by ligating the lymph vessels of the neck in order to demonstrate the continuity between them and the lymph vessels of the eye or orbit.

#### A.—INJECTIONS INTO THE ANTERIOR CHAMBER.

(1.) *Crystalloid solutions.*—Crystalloid solutions are not satisfactory because they are likely to diffuse through all the tissues. A most remarkable example of this diffusion was given by employing nickel salts which are precipitated in red needles of dimethylglioxine.

The precipitates are found even in the interior of the arteries.

(2.) *Injections of colloid solutions.*—The colloid substances are equably diffusible, but they show a much greater predilection in their diffusion. I have used 1 per cent. solutions of sodium carminate, cyclamin, Bengal red, etc., which are found in the sections after precipitation with silver or lead salts. The injected material has penetrated into the deep layers of the cornea, into the iris, largely into the spaces of Fontana; from there it has diffused into the sclerocorneal tissue surrounding Schlemm's canal and the anterior ciliary veins. It has not penetrated into the veins of the iris or of the limbus, including Schlemm's canal, nor into the posterior chamber, nor the vitreous body and perichoroidal space.

(3.) *Injections of olive oil.*—Sterile olive oil gives the best and most characteristic results. Its elimination is extremely slow and it causes no inflammatory reaction.

Five or six weeks after the injection of one drop of olive oil into the anterior chamber evisceration of the orbital contents is made, and these are fixed in Flemming's osmic fluid. The smallest trace of oil can be found by the black color due to the reduction of the osmic acid.

The following is the process of elimination:

(a) Slow and partial emulsion of the drop of oil due to the slight alkalinity of the aqueous humor, beginning 10 to 15 days after injection;

(b) distribution of the emulsified droplets in three directions: (1) against the posterior surface of the cornea without piercing Descemet's membrane; (2) into the spaces of Fontana through the trabecules of the ligamentum pectinatum; (3) into the iris stroma through pupillary stomata located where the mesodermic and ectodermic parts of the iris join each other.

In this case the droplets traverse the whole of the iris stroma and penetrate into Fontana's spaces through the peripheral stomata which open behind the ligamentum pectinatum.

At the same time with the emulsion and distribution of the droplets, the leucocytes come from the iris capillaries and migrate through the anterior surface of the iris. The bloodvessels of the ciliary body do not participate in this diapédesis.

The leucocytes by chemotaxis are in small numbers attracted to the foreign substance and begin their work of phagocytosis immediately in the anterior chamber.

The phagocytosis is especially active in Fontana's spaces where the droplets are retained. They are too large to pass through the normal channels of elimination in the sclera; thus they are attacked by the leucocytes whose protoplasm is charged with a large number of microscopical oily particles; the phagocytes then enter the lymph space surrounding Schlemm's canal and the anterior ciliary veins and in this way get outside of the sclerotic. Here, since the perivenous sheaths are much larger, the lymphatic current is almost *nil*. From this an accumulation of phagocytes results which die, disintegrate, and thus set free the oily particles having been retained in their protoplasm. These coalesce and again form, sometimes voluminous, drops lying in the lymphatic spaces lined by endothelial cells.

The presence of the animal fat outside of the globe prevents the recognition of the final route followed by the vegetable oil, since both of them appear black from osmic acid.

The oil is eliminated exclusively by the routes just described. It is never found inside the veins, in the posterior chamber, in the vitreous body, in the perichoroidal space; it never penetrates outside the globe into the subconjunctival space or Tenon's space.

(4.) *Injection of solid bodies in suspension* (China ink, carminate of lead, colloidal silver).—Such bodies brought into the

anterior chamber very quickly clog all the normal passages for the outflow of the aqueous humor. This obstruction and the inflammatory phenomena which accompany it cause grave disorders in the intraocular circulation. The results from this form of experiment belong into the realm of pathology and can cause only erroneous conclusions; I may mention penetration into the vitreous body, the perichoroidal space and infiltration of the cornea.

B.—INJECTION INTO THE VITREOUS BODY.

These experiments prove that the substances introduced into the vitreous body leave the globe exclusively by the posterior channels. The anterior and posterior lymph circulations are independent of each other.

Since the anterior segment of the rabbit's eye is very large the injection must be made behind the æquator of the globe, otherwise the injected material will diffuse into the posterior chamber and be taken up by the anterior circulation.

The same substances were used as before.

(1.) The crystalloid solutions behave in the same manner as they do in the anterior chamber. They diffuse into the meshes of the vitreous body, pass through the zonule and thus reach the anterior segment; they infiltrate the retina and choroid and the perichoroidal space; finally, the greater part passes out through the papilla and is found as well in the interior of the bloodvessels as in the perivenous lymph spaces.

These diffusion phenomena are not physiologic.

(2.) The colloid solutions give much more characteristic results. For instance, the elimination of carminate of sodium takes place exclusively by way of the lymph spaces surrounding the central vein in the optic nerve. The zonule of Zinn forms a complete barrier to a forward flow of these liquids.

The internal layers of the retina are impregnated; the coloring matter travels along Mueller's fibres to the external granular layer only. There is no trace of it in the choroid, the perichoroidal space or the vorticos veins.

(3.) Olive oil injected into the vitreous body is eliminated even much more slowly than from the anterior chamber. It takes several months for one drop. The process of elimination is identical with the one described after anterior injections. The drop is at first emulsified, then the droplets are taken up by phagocytes coming from the posterior part of the ciliary body.

The leucocytes charged with oil then leave the globe through the lymph spaces of the papilla and the optic nerve. These are the only routes followed by them to the exclusion of all others.

(4.) Solid bodies in suspension introduced into the vitreous body do not produce glaucomatous symptoms, but symptoms of phthisis of the globe by liquefaction of the vitreous body. If a small injection has been made behind the æquator the injected material does not get into the anterior segment. The phagocytes, much more abundant than with oil, attack the foreign substances. They come solely from the capillaries of the posterior part of the ciliary body and of the ciliary retina as far as the ora serrata. The injected material and the leucocytes leave the eye by the lymph vessels of the optic nerve.

Under normal conditions the foreign substances never penetrate into the perichoroidal space; we may therefore conclude that it constitutes an independent lymph cavity in the eye. If the injection is made directly into this space, the injected substances pass into the lymph sheaths of the vortious veins, but never spread into Tenon's space.

Of the four groups of substances used, two are unfit for the study of the normal route of the intraocular circulation; the crystalloid solutions which diffuse indifferently into all the tissues cannot be assimilated by the fluids secreted by the organism; the solid bodies cause pathological changes within the eye. There remain, then, the colloidal solutions and olive oil.

The experiments made with these two give virtually the same results; the elimination takes place not by the veins but by the perivenous spaces. Since the introduction of these substances into the eye produces no noticeable disturbances and does not seem to modify the physiological condition in anything, we may rationally conclude that they leave the eyeball by the normal channels for the elimination of the intraocular fluids.

*Ligation of the lymph vessels of the neck.*—As previously stated the presence of the fatty tissue does not admit of following the route taken in the orbit by the fat injected into the globe. Yet, it would appear important to know what the perivenous spaces lead to after having left the episcleral tissue.

To this end I have resorted to ligation of the lymph vessels of the neck. About a quarter of an hour after the subcutaneous injection of fluorescein the lymph vessels become easily visible by their greenish yellow color.

A ligature is passed around the lymph vessels accompanying



the external and internal jugulars, on one side. It is important that the external lymph vessel is, also, ligated, because there is almost constantly an anastomosis between the two vessels, as R. Boddaert<sup>3</sup> has shown. After these ligations Ehrlich's line can be seen to disappear more slowly from the eye on the ligated than on the other side. When both eyes have lost their green color a new injection of fluorescein is made under the skin of the abdomen, and the following observed:

After ten to twenty minutes Ehrlich's line is found as usual on the normal side; on the other side the phenomenon described by Hamburger, and which he called "Ventilverschluss" (valve closure),<sup>4</sup> can be seen with the greatest nicety. At the margin of the pupil, mostly upwards, a very small green point appears; this point grows larger and then pretty rapidly spreads into the aqueous humor. A few minutes later another point appears, then a third, and this phenomenon repeats itself until the coloration of the aqueous humor is so dense that it hides the pupil and iris.

The normal eye during this time becomes much less colored. In a few hours it has lost the color, while the other eye still shows the fluorescein plainly. After twenty-four hours the evidences of the experiment are still in progress. Two or three days later it has lost its characteristic nicety and does no longer strike an unprepared observer.

The reverse experiment consists in ligating the external and internal jugular veins, leaving the lymph vessels intact.

In this case the coloration persists slightly longer in the eye on the side of the ligatures, but the difference cannot be compared with the one following the ligation of the lymph vessels.

This retardation in the lymph circulation can be explained by the venous congestion which may obliterate the perivenous lymph spaces.

These experiments prove then that the aqueous humor is poured into the spaces surrounding the anterior ciliary veins, in the orbit these sheaths are continued by lymph vessels which are emptied into the jugular lymph trunk of the neck. In fact, these lymph vessels in the orbit, the existence of which has always been denied, are thus put in evidence. In order to do so I have made use of Professor O. Vander Stricht's process, which consists of fixing the organs in place so that no fluid can flow out when they are cut. Young rabbits, 2 or 3 months old, are hung up for a few minutes head downward, then strangled

by means of a cord; the head is then cut off without disturbing the ligature and plunged into a large quantity of some fixing fluid (Müller, Zenker, etc.).

When the specimen is fixed the contents of the orbits are eviscerated and treated in the usual manner. Under this treatment all nourishing fluids are held in place; the veins and arteries of the orbit are filled with coagulated blood, the smallest capillaries are recognizable by the presence of the formed elements of the blood. Besides the bloodvessels the lymph vessels are plainly visible, distended by lymph and lined by their characteristic endothelium. Such lymph vessels are found all along the principle veins.

#### CONCLUSIONS.

From these experiments we can conclude that in the rabbit:

- (1.) There is an intraocular lymph circulation.
- (2.) That this circulation takes place in the following manner:

(a) The aqueous humor of the posterior chamber is secreted by the anterior ciliary processes; that of the anterior chamber comes from the anterior surface of the iris, especially at the large and small arterial circles (Hamburger, Wessely).

(b) The aqueous humor is very slowly eliminated. That from the posterior chamber is poured into the anterior probably through the pupil; a minimal part passes through the endothelium and Descemet's membrane and nourishes the deepest layers of the cornea; another part enters the iris through the pupillary stomata and perhaps through certain places in its anterior surface. The largest part goes to the iris angle and Fontana's spaces, into which the lymph from the iris stroma is also directed.

At this locality the liquid flows out into the lymph spaces surrounding Schlemm's canal and the anterior ciliary veins.

Into these spaces furthermore other lymph lacunæ are emptied, which come from the sclerotic and the cornea; these lacunæ lead the lymph of the cornea into the perivenous spaces. Having passed through the limbus the spaces continue on in the shape of lymph vessels, first surrounding, later on accompanying, the veins; these empty into the jugular vessels which accompany the inner jugular vein.

(c) There is no other way for the outflow of the aqueous humor, either by the venous system or by the lymph spaces of the posterior part of the eye.

(*d*) The posterior lymph circulation is independent of the anterior one; it comprises that of the vitreous body and of the choroid.

(*e*) The lymph secreted from the posterior part of the ciliary process and the ciliary retina. It leaves the globe exclusively by the lymph sheaths surrounding the vessels of the optic nerve, and from there probably passes into the lymph vessels running side by side with the central and then the ophthalmic vein. It never reaches the anterior chamber or the perichoroidal space.

(*f*) The lymph secreted by the numerous choroidal vessels is collected in the perichoroidal space; this forms a blind sac ending forwards at the insertion of the ciliary muscle, backwards at the choroidal ring of the papilla.

The fluid is eliminated from this space by the lymph sheaths of the vortious veins. These sheaths continue, probably around the veins outside of the sclerotic and become lymph vessels running side by side with the large veins; at any rate they do not empty into Tenon's space.

(*g*) The subconjunctival space and Tenon's space are independent of the lymph circulation of the eyeball.

(*h*) The lymphatic system of the orbit may be explained in the following way: The efferent veins of the eyeball (anterior ciliary veins, vortious veins, central retinal vein) are surrounded by lymph sheaths where they leave the eyeball. These sheaths serve to empty the aqueous humor (around the anterior ciliary veins), the lymph of the vitreous body (around the central vein), and the lymph of the perichoroidal space (around the vortious veins). These sheaths in the orbit continue on in the lymph vessels accompanying the veins and act as contributors or sources for the jugular lymph trunk.

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## MEDICAL SOCIETIES

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### FORTY-NINTH MEETING OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY.

Held at Washington, D. C., May 6th and 7th, 1913.

Reported by Mrs. M. C. Repp.

The President, Dr. Myles Standish, in the Chair.

(Concluded)

*Report of a Case of Cavernous Sinus Thrombosis Resulting from Small Abscess in the Skin of Temple. Vaccine Treatment.*—Dr. Albert S. Snell, Rochester, N. Y.

The patient was an otherwise strong, healthy man of 24 years. For a day before his first visit the vision of the right eye had been rapidly growing dim and there was swelling of the lids. There was found to be œdema of the conjunctiva, exophthalmos, steamy cornea, slightly reacting pupils, and but little mobility of the eyeball. There was also œdema of the disc and tortuous veins. There was rapid pulse and low fever. There was a small crusted area on the right temple. The patient stated that there had been a pimple here and that he had pinched it a few days before. The condition was considered an orbital cellulitis. On the fourth day the condition had grown much worse. The lesion on the temple was then explored and the orbital cavity punctured. By the 7th day the condition of the patient was critical and anti-streptococcic serum was given. By the 17th day the patient had so far improved as to be almost normal and recovery seemed assured. On the 21st day the patient's condition became very serious and on the next day death took place.

#### DISCUSSION.

Dr. Emil Gruening, New York: Infective thrombosis of the sinuses is quite prominent in otological practice, but the otologists do not use serum. They remove the clot and they generally succeed in saving the patient. At the meeting of the International Otological Society last year Mr. Ballance, of London, read a paper on the operation of removing clots from the cavernous sinus. I think it would be of the greatest importance for ophthalmologists to study the matter of reaching the cavernous sinus and getting directly after the thrombus of the cavernous sinus.

Dr. F. H. Verhoeff, Boston: A year ago I performed an autopsy on a case that was an example of what such cases can be. It was a man who had a small furuncle inside of his nose and in a few days this extended up on the outside of his nose along the subcutaneous tissues into the orbit and produced a cellulitis, and in a few days he was dead. At autopsy he showed this cellulitis and thrombosis of the cavernous sinus and a meningitis. The organism here was the very common staphylococcus aureus.

*Sarcoma of the Choroid, not Demonstrable by the Ordinary Transilluminator.*—Dr. Allen Greenwood, Boston.

The patient was a young woman, with an acute fulminating glaucoma, which had been treated for 10 days by atropin ordered by her family physician. When first examined by the writer there was absolute glaucoma, no view of fundus, and only a slight light reflex. Absolutely no vision, so that the visual field could not be mapped out. No sign of trouble in the other eye. Suspecting a possible sarcoma, the transilluminator was used, without demonstrating any tumor. An iridectomy was performed, and a week later the media had cleared sufficiently to give a view of the fundus. The optic disk could not be seen, as it was covered by a detachment of the retina. The eye was removed and showed a sarcoma close to and covering the optic nerve. This could be demonstrable only by placing the transilluminator as close as possible to the exit of the optic nerve.

*Epibulbar Carcinoma, with Histological Examination of the Specimen.*—Dr. G. E. de Schweinitz, Philadelphia, and Dr. T. A. Shumway, Philadelphia.

The case which we report was in a man aged 34, having a very large fungus-like, epibulbar growth which had begun about 14 years previously as a yellowish-white papule at the inner corneal margin of the left eye. During the last five years the growth covered the whole front of the eye and protruded between the lid. The eyeball was enucleated about 6 months ago at which time exploration of the orbit failed to reveal any suspicious tissue. About 3 months later the patient returned with a recurrence of the growth at which time a complete exenteration of the orbit was performed, and up to the present time there is no sign of recurrence. Microscopic examination of the growth shows it to be primary carcinoma of the conjunctiva. There was no perforation of the bulbus.

## DISCUSSION.

Dr. Emil Gruening, New York: As I look back on my own experience in regard to epibulbar growths, I think they are to be dreaded. They all have recurrences. I think it is a mistake not to eviscerate at once. All the cases of epibulbar growth which I had and could follow, died; sarcomas and carcinomas both.

Dr. G. E. de Schweinitz, Philadelphia: I think, with Dr. Gruening, in most instances it is proper to enucleate and in this instance to eviscerate. I recall a patient who came to me 15 years ago in Philadelphia. She is perfectly healthy at the present time, but she probably would not have been a very loyal patient had I removed the eyeball on that occasion. On the other hand, Dr. Sweet and I had a case which died promptly. It is safer in most instances to take the eyeball out, as Dr. Gruening says.

*Toxic Amblyopia Due to Tobacco Alone.*—Dr. Matthias Lanckton Foster, New Rochelle, N. Y.

Adam says, in his *Ophthalmologische Diagnostik*, published in 1912, that it is doubtful if tobacco alone is competent to induce toxic amblyopia. To prove this competency on the part of tobacco a case of toxic amblyopia is reported, met with in a man 65 years old, who had been a total abstainer from intoxicating liquors for 40 years, who presented no symptoms of multiple sclerosis, or of any other organic disease of the central nervous system, and no signs of any form of poisoning except by tobacco, but had been an inveterate smoker for many years. The treatment consisted in total abstinence from tobacco with strychnine hypodermically, and by mouth over a period of 11 months at which time the vision was normal under proper correction, the final vision being 20/10— in one eye, with no central scotoma for red, and 20/15— in the other, with a minute central scotoma for red.

## DISCUSSION.

Dr. Emil Gruening, New York: This is new to me. I have never seen a case of tobacco amblyopia. All the amblyopias that I see that concern the macula-papillary area are cases in which the subjects both smoked and drank to excess. I think that Milliken, of Constantinople, many years ago, stated that Mohammedans who smoked excessively, but did not drink, never have

tobacco amblyopia. My Cuban friends also tell me that among Cubans who smoke a very strong tobacco which contains much nicotine this form of amblyopia is also unknown. This is in the line of my own observation. I could always make them confess that they did drink.

Dr. G. E. de Schweinitz, Philadelphia: There are cases on record in which it was believed that tobacco was the sole cause of toxic amblyopia. It is extremely difficult from a history of a patient to determine as to the patient's consumption of drugs and difficult to decide as to the patient's veracity. The interesting fact remains of a number of cases of tobacco amblyopia of women working in tobacco factories. In these cases the amblyopia disappeared when a change of occupation for the women was secured. Nevertheless it is extremely difficult in the vast majority of cases to eliminate the use of alcohol as well as that of tobacco. There is another thing to be taken into consideration. From the experimental standpoint it has been difficult to work with tobacco. There exists in certain horses in Australia a well known form of amblyopia. This depends in all probability upon their eating of the wild tobacco, which grows there.

*A Case of Paralysis of Divergence.*—Dr. William Zentmayer, Philadelphia.

The patient, a male, aged 33 years, was a barber. Diplopia came on suddenly about 1 year ago and has persisted. Troublesome at near work only. Characteristic diplopia. He was enabled to do his work by combining with the correcting lenses for a low compound hyperopic astigmatism, 8° prisms base out before each eye. Fundus and field were normal. There was a positive Wassermann and neurological examination revealed symptoms suggestive of a lesion in the left hemisphere. Under mercurials and potassium iodide the general condition improved, but no change in the ocular phenomena developed.

*The Eye Examination a Help to Diagnosis of Commencing Arterio-sclerosis.*—Dr. Edward R. Williams, Boston.

The object of this paper is to show how eye examinations may help in diagnosing commencing arteriosclerosis. In a series of 40 cases the diagnosis was made according to the classification of Alleman. In addition all were divided into three groups: (1) Where diagnosis of arteriosclerosis was made and the patient died from a cerebral hæmorrhage—9 cases. (2) Typical

cases where a definite early diagnosis was made and later confirmed by repeated examinations—17 cases. (3) Suggestive cases, in which of 10 only 1 examination has been made or other data are lacking—14 cases.

Diagnosis may be either premonitory or confirmatory. The premonitory diagnosis has been always confirmed by subsequent fundus examinations, estimation of blood pressure, and general physical examination. The confirmatory diagnosis includes those suffering from chronic nephritis who seek relief for failing vision. The diagnosis of commencing arteriosclerosis is made if the following signs are more or less definitely seen in the fundus: (1) Tortuous terminal arteries, especially the arterial twigs close to the macula. (2) Depression of veins by sclerosed arteries, most easily seen close to the disk where the vessels are large. Comparing the crossing of sclerosed and normal arteries, it is often easy to see that the vein beneath the hardened artery is on a different level. There is often a slight bulging of the distal end of the vein. (3) The typical "silver-wire artery" was rarely seen among these patients. (4) Hyperæmia or "brick-red" color of disk, often with more or less blurring of its edge. In addition to these fundus changes there was noted a disturbance of the muscular balance in 9 cases, 34 per cent. of the patients in the first two groups. Heterophoria seems to be a functional disturbance, attributable to arteriosclerosis, which has not been mentioned by other observers.

Prognosis as to vision: In the first group of fatal cases, one-third became partially blind, the remainder had good vision till the end. Among the patients of the second group the variation of vision has been insignificant. As would be expected, practically all patients in the third group have normal vision.

#### DISCUSSION.

Dr. W. F. Mittendorf, New York: I have listened to the paper with a great deal of interest. It details cases which come early with degenerative changes which require the assistance not only of the ophthalmologist, but of the internist. As Dr. Williams pointed out, a great many of these cases are not aware of the marked decrease of vision and would go on in the ordinary routine of life until some serious change would take place. I have seen a great many of these cases and I have been very careful to have their arterial pressure measured. One of the first indications of these cases is to try to reduce arterial pressure. I would like to mention here that one of the greatest remedies in



my experience has been the Russian oil of spermaceti. Taking a tablespoonful 3 times a day will reduce pressure from 235 to 175 or 185. Of course the great remedy in these cases is outdoor life. If you can get these patients to give up their business occupation, to go out and play golf, to row, or anything of that kind you will benefit them materially, especially in the group of cases where the depression of the veins by the arteries is very marked.

Dr. Allen Greenwood, Boston: One of the important symptoms is the fact that a slight disturbance in central vision is often the first symptom. The patient would complain in reading the test type line that the central letter is raised a little above the other. I think that is quite common in these cases of arteriosclerosis.

*A Case of Thrombosis of the Retinal Vein, with Remarks.—*

Dr. J. Herbert Claiborne, New York.

The case described was in a maiden lady aged 44, in excellent general health, who consulted me because of a big "block" of smoke which appeared suddenly before the left eye after rising in the morning and which gradually grew less marked as the day advanced. The left optic disk was very red, the veins enlarged, small hæmorrhages between the disk and the macula. The next day the hæmorrhages were more marked and the veins were larger; the vision was blurred and there was a small scotoma. The urine was negative; blood pressure 124; Wassermann negative. A month later the condition appeared like choked disk. The patient was given potassium iodide in small doses and three months later had greatly improved. I believe that thrombosis of a vein presupposes a solution in the continuity of the intima thus affording a basis for the thrombus, and I infer that such was the condition in my case. This case seems to me to be unique on account of the good general health of the subject.

DISCUSSION.

Dr. Allen Greenwood, Boston: I think that a certain number of these cases of venous thrombosis are afterward, from a few months to a year and a half, apt to develop a glaucoma, uninfluenced by eserine or pilocarpin, which requires iridectomy for cure. I have had 3 cases in my practice of glaucoma following thrombosis of the central vein. The eye must then be removed as the ordinary treatment of glaucoma is unavailing.

*Teaching Physiological Optics.*—Dr. Walter B. Lancaster,  
Boston

Physiological optics is the most important subject the student of ophthalmology has to study, judged either by the amount of time he will spend in his private practice in work which is concerned with some part of that large field, or judged by the fact that it is physiological optics which is the distinguishing and characteristic feature of our special field—that part which is not found in any other branch of medicine and therefore will not be taught elsewhere, as are pathology, anatomy, general physiology, etc., which are taught all medical students.

At present no provision that I know of is made in this country for teaching that subject in the only way it can be adequately taught, viz., by a course of several hundred hours, largely laboratory work.

## DISCUSSION.

Dr. Edward Jackson, Denver: In the University of Colorado for 2 years I have done what has seemed to me the most important work I could do for graduates in general medicine. For 2 years the class is divided into sections for demonstrative work and the demonstration work in ophthalmology has occupied 16 hours. I take two sections of 16 men each and see what the optical apparatus did to a pencil of rays and then let them use each others' eyes for practising, particularly with the ophthalmoscope. After explaining the method I stand over the men while they attempt to practice it, each student using another student's eyes to practice on. At first I have them look in without any mydriatic. Several got good views at the first lesson. At the next lesson I put a drop of cocaine into each eye and thus the pupil is sufficiently dilated to make a very favorable opportunity for the use of the ophthalmoscope.

Dr. B. Alexander Randall, Philadelphia: I agree with what Dr. Jackson has said. I would like to say that such instruction has been given in the University of Pennsylvania for a long while. In 1884 Harrison Allen asked me to take the Laboratory of Physiology for the autumn and give the course in physiological optics. In later years under de Schweinitz the teaching has been developed to a very notable extent. It is not, in our course, practical to give to physiological optics several hundred hours, but there are many hours given to it. The artificial eye is used, the methods of refraction are taught and a great deal more in that institution, at least, is put forth than in Dr. Lancaster's paper.

*A Word More on Test-cards and Type.*—Dr. B. Alexander Randall, Philadelphia.

The published cards are perhaps improving; yet flagrant offenses against the principles of their construction show that many are merely empirically based on Snellen's data, still less on the principle given us by Hooke and Helmholtz. Especially is this true of school-charts for illiterates. The difference between Paris feet and our English standards is ignored; the calculations, if made, are generally faulty, following Snellen in using the tangent of the angle of  $5^\circ$  instead of twice the tangent of half the angle; and the standard is stated to be constituted by strokes instead of interspaces subtending an angle of  $1^\circ$ . They are printed on glaring white cards, giving the utmost confusion by irradiation, when the execution is otherwise fair.

The following cases and instruments were exhibited:

*Two Cases of Binocular Coloboma of the Optic Nerve in the Same Family.*—Dr. George S. Crampton, Philadelphia, presented two patients with the following histories:

Case 1.—Man aged 20, with large coloboma of the nerve entrance of right eye, surrounded, except on the temporal side, by a coloboma of the choroid. The almost round scleral opening,  $2\frac{1}{2}$  times the diameter of a normal disc, is sharply undercut, and the vessels, faintly seen in the centre of the deep cavity, appear again about the edges of the pseudo-disc and pass out to the normal appearing retina. Refraction of fundus —6.00 D., of bottom of cup —18.00 D. He has poor perception of light only. Left eye is slightly myopic with corrected vision of 6/6. The scleral opening is transversely oval and somewhat larger than a normal disc. No coloboma of choroid. Cup undermined laterally but not so deep as in right eye.

Case 2.—Sister, aged 5 years. Right eye blind, left 6/12. Lateral nystagmus. Condition somewhat similar to the above but there is no coloboma of the choroid touching the disc. Both scleral openings are round and sharply cut with vessels distributed about the rim. Nystagmus prevented the measuring of the depth of the cavities. In the right eye some distance below the scleral opening, there is a sharply defined, round area of exposed sclera two-thirds the size of the disc, and elsewhere in the lower fundus a small irregular area of coloboma of the choroid. Three other members of the family were examined and found to be free from fundus defects.

*Fatigue of Convergence, and its Varieties.*—Dr. Lucien Howe, Buffalo, N. Y.

This paper is supplementary to my paper describing the ergograph before the American Medical Association in 1912. During the past year a considerable number of tracings have been made of normal as well as pathological eyes. Fatigue is the process of becoming fatigued, or tired, when a muscle is repeatedly contracted. We should use the word fatigued and not fatigue to express the condition of a muscle which has thus repeatedly contracted. When the fatigue of a muscle is traced by a pen on the revolving drum of an ergograph, the strength of each contraction is shown by the vertical excursion of the pen and the time is shown by the horizontal distance traced on the drum. It can be said without fear of exaggeration that the ophthalmic ergograph gives us promptly more accurate and complete data concerning the development of fatigue, especially the fatigue of convergence, than can be obtained in any other way.

Dr. Charles H. May, New York, presented the model of an ophthalmoscope which could be used either as an ordinary reflecting or as a self-luminous electric instrument. The mirror was interchangeable. This arrangement proved useful when, for any reason, such an exhaustion of the battery, burning out of the lamp or injury to the cords, the electric ophthalmoscope became useless at a time when the defective parts could not be replaced. Under such circumstances, the electric mirror could be removed and an ordinary tilting mirror inserted; and the ophthalmoscope was then changed into one of the reflecting type.

Dr. S. Lewis Ziegler, Philadelphia, demonstrated a Nernst lamp and stated that the company had gotten out a very large model. They have perfected it and it gives a very beautiful illumination. You can illuminate the field of operation and the assistant can hold it in an easy way. It is adjustable. You can use it on either current. It gives normal values, such as you would have in sunlight. It is not so fragile as others.

Dr. Walter B. Lancaster, Boston, demonstrated on a rabbit, an instrument designed to introduce the transilluminator behind the eyeball so that one could transilluminate the eye near the posterior pole.

Dr. J. Herbert Claiborne, New York, demonstrated a new kind of cataract glasses, which were very light as to glass and frame. The glass weighed three-quarters of an ounce.

Dr. David Harrower showed a light to be used with the ophthalmoscope for illuminating. The battery can be bought anywhere for 75c., with the lamp for \$1.25. Therefore it is a very cheap and simple lighting method.

Dr. J. Norman Risley announced that he had devised a table for use in the clinic room or office. The table gives ample room for everything that one may need, with a roller top covering all in.

Dr. F. H. Verhoeff exhibited an eye dropper bulb, which he said was as good a transilluminating mirror as any attachment. He also exhibited an attachment made out of two thermometer cases, with a disk of hard rubber for color scotomata. He found that the best transilluminator was made by putting an electric ophthalmoscope, the ones that pull out are most convenient, and put a piece of the eye-dropper over the end of that and it makes a perfect transilluminator.

Dr. R. L. Randolph showed two cases. Case 1. Presented a mass in the left eye lying a little below the equator of the eye. He thought it an inflammatory condition. Case 2. One of sympathetic ophthalmia. A boy injured in an explosion 2 years ago by a torpedo.

Dr. F. H. Verhoeff showed slides of Parinaud's conjunctivitis, demonstrating an organism which he believed was a leptothrix and the cause of the disease.

#### OFFICERS FOR ENSUING YEAR.

President, Dr. Robert Sattler, Cincinnati, O.

Vice-President, M. H. Post, St. Louis, Mo.

Corresponding Secretary, Dr. Arnold Knapp, New York.

Recording Secretary and Treasurer, Dr. William M. Sweet, Philadelphia.

Next meeting place, Hot Springs, Va., some time in May.

There were 95 members registered, the secretary considering it the largest attendance yet had at a meeting.



OPHTHALMOLOGICAL SOCIETY OF THE  
UNITED KINGDOM.

Annual Meeting.

The first meeting of this Society under the revised constitution was held on Thursday and Friday, April 24th and 25th, at the home of the Royal Society of Medicine and at the Royal London Ophthalmic Hospital, City Road, Mr. J. B. Lawford, occupying the chair.

Mr. Frank Juler read a communication entitled "Acute Purulent Keratitis in Exophthalmic Goitre, treated by repeated Tarsorrhaphy." The case was discussed by the President, Mr. Juler, senr., Mr. Coulter, Mr. Leslie Paton, Mr. Priestley Smith, Mr. Treacher Collins, Mr. Jessop, Mr. Bishop Harmon, Mr. Inglis Pollock, Mr. Johnson Taylor; and Mr. Frank Juler replied.

Mr. Ormond read a paper on two cases of permanent hemianopsia following migraine.

Dr. James Taylor and Dr. Gordon Holmes read papers on (a) "Conditions present in several members of a family with hereditary optic atrophy"; (b) "Unusual conditions associated with optic atrophy, of the family type." The first paper gave an account of two families showing a similar defect in vision. In the first family, D., the members of only one generation are affected. There are four brothers living, and two sisters; and of the four brothers, three are affected in a similar way, the fields showing the existence of a central scotoma for colors. The discs are pale. In the other members of the family there is nothing to suggest a similar defect. In the eldest of the three affected, the only other symptoms complained of are some weakness in the legs, and occasional difficulty in controlling the bladder. The reflexes are all normal. In the youngest brother, the visual symptoms are the only ones complained of. In the middle brother, besides the visual symptoms there is loss of knee jerk, and a sluggish reaction of the pupil to light, pains in the legs, and analgesia of the lower limbs—signs and symptoms of tabes dorsalis. In this patient also, there is a definite history of syphilis. In the second family, C., the affection of sight is similar, but it is spread over more than one generation. With pale optic discs in the members affected there is a central scotoma for white and for colors. In one member, optic neuritis was observed 8 years ago. In one family, four members are similarly affected, while

a fifth has congenital cataract. In a collateral branch, three cousins have suffered, and a sister of these cousins had a large family, one of whom suffers from the trouble. Another died of an orbital tumor. Two other cousins, the sons of another sister, suffered from defective sight, apparently the result of defective development. The points emphasized in the paper are (1) the co-existence of family optic atrophy with tabes, yet the absence of any apparent effect of the tabes on the optic nerve in the cases affected. (2) The transmission of the optic atrophy in the female line, as shown by the family tree. (3) The occurrence of migraine in several of the patients affected, and its persistence even after practical blindness has been reached. (4) The occurrence of other eye defects in members of the family—congenital cataract in one, an orbital tumor in another, and defective eyes in two others.

At the Thursday afternoon session, Mr. Angus Macnab read a paper on an operation for the excision of the conjunctival sac and lid margins. The conjunctiva and lids are cleansed with hydrarg. perchlor. 1 in 2,000. If there be any discharge from the lacrimal sac, the ordinary operation for its excision should precede the treatment of the conjunctival sac. The lids are scrubbed with ether soap, and the disinfection completed by means of benzine. The rapidity and ease with which the operation is performed will greatly depend on the absence of bleeding, and the manner in which the primary incisions are planned will have a considerable influence on the hæmorrhage. A spatula is introduced into the sac, and the lids successively stretched over it as they are incised. He commences with the lower lid, entering the knife about 3 mm. from the lid-margin and opposite the junction of the inner quarter with the outer three-quarters of its extent, and cutting freely down on the tarsal plate the incision is carried parallel to the lid margin, to a point just beyond the external canthus; placing the spatula under the upper lid a similar incision is made which will meet the former at the external tarsal ligament. These incisions will pass down into the loose areolar tissue on the surface of the tarsal plates and into the orbit above and below the external tarsal ligament. A pair of narrow sharp pointed scissors is introduced with one blade above and the other below the external ligament and the incisions are joined, some care being observed not to notch the skin at the angle at the same time.

The next step will depend on the condition of the conjunctiva:

if it is thickened and glistening white so as to be readily visible, the edges of the lids can be seized with a vulsellum forceps and drawn inwards and forwards towards the nose, while the conjunctiva is separated from the orbital tissues below with a blunt-pointed scissors, until the mass only remains attached at the inner quarter of the lids which was not incised at the commencement of the operation.

If the conjunctiva be thin, redundant, folded and hyperæmic, as is often the case, it would almost certainly be buttonholed by such a procedure, and it is far better to introduce the left forefinger into the conjunctival sac and thus stretching the membrane, separate it from the orbital tissues with the scissors. In these cases there will always be a rather free venous oozing, but as the dissection can be carried out by touch this can be neglected until the sac is thrown inwards, when a pad wrung out of hot water will usually leave the wound dry. The original incisions are now completed by means of sharp-pointed scissors, one blade of which is passed under the skin, and the cuts made so that the lines of the first incisions are continued till they meet just beyond the internal canthus. The scissors are then rotated about a right angle, and the whole mass consisting of lid-margins, conjunctiva, and tarsal plates can be removed by a single cut. At this stage the angular vein will be divided and there will be a free hæmorrhage which can be easily controlled by forceps and ligatures. The wound is then closed by means of four sutures of fishing gut, which pick up the tissues at the bottom of the wound: the dressing is covered with a large pad of wool and a light pressure bandage. Healing almost invariably occurs by first intention, and there is only a thin scar to mark the site of the operation.

The operation can also be performed when the remains of a shrunken globe are present; in such cases the globe is pulled forwards and dissected out with the conjunctiva.

In cases where the whole globe is present and the operation is being performed originally instead of the ordinary excision, the incisions are made in the same way as before recorded, the lower lid is then pulled up and the dissection of the tarsal plates and the conjunctiva from the orbital tissues continued up to the attachment of the conjunctiva to the globe, when the capsule of Tenon is opened; the upper lid is then treated similarly, and the excision continued by dividing the muscles and the optic nerve as in the usual manner. The completion of the operation is by

separating the mass at its inner half in the manner already indicated.

The majority of my patients have been asylum patients, but I have used the same operation in the case of a malignant growth at the external canthus, which was invading the conjunctiva and the cornea, and in which there was no recurrence one year after the operation. One of my patients had trachoma in both his empty sockets which contained the remains of shrunken globes; here the radical cure of the trachoma was achieved by the excision of both conjunctivæ.

I have been enormously impressed by the relief given to the patients who had discharging sockets by this operation, and have no hesitation in recommending it to those persons who go about with an empty socket covered with a shade especially as appearance too is greatly improved by the procedure here related, and as shown in the photographs.\*

Mr. N. Bishop Harman read a paper entitled: "An Analysis of Three Hundred Cases of High Myopia in Children with a scheme for the grading of Fundus Changes in Myopia."

These cases were collected during educational work in London, and all belonged to the elementary schools, so were socially of the working classes. All had come under observation in connection with the new schools for myopes, many had been watched for several years. Out of the 300, boys were 46 per cent., girls 52 per cent., a difference of 6 per cent., which agrees with the difference in the sexes in ordinary vision tests. The bulk of the cases seen were aged 8 to 12 years. Cases in the earlier years were nearly all boys, which suggest a greater care by mothers for their men-children. The degree of myopia ranged from 4 to 25 D, the bulk, 64 per cent., were from 6 to 12 D. The extreme degrees were nearly all in girls. Hereditary influence was marked in 9 per cent. Astigmatism, which the author considered a most likely exciting or adjuvant cause of myopia, was present in 64 per cent., a far higher proportion than in other defects. Previous keratitis was found in 11 per cent. Congenital defects, such as albinism, coloboma uveæ, dislocated lenses, aniridia, existed in 5 per cent. Squint in 44 per cent. Nystagmus, mostly associated with bad vision, in 7 per cent. The lens had been removed by operation in 3 per cent. but the improvement of vision was not great.

Dealing with fundus conditions Mr. Harman criticized ad-

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\*Concerning this operation see: John Green, *Am. Journal of Ophthalmology*, June, 1894, also Adolf Alt, same *Journal*, March, 1903.—Editor.

versely their present nomenclature for changes about the disc; he proposed that the fundus should be spoken of as first, second or third degrees according as the atrophy at the disc was as wide as one half the disc diameter, the whole diameter, or greater than that. To this would be added other details about the macula, etc. He showed a chart giving the correlation of refraction and fundus change according to this plan, it bore out his contention. He maintained some definite notation was necessary when these cases came under observation for a definite object, such as the regulation of education.

Grave changes with lens changes, vitreous opacities, or detached retina, numbered 8 cases, or less than 3 per cent., of these 3 or 1 per cent. went blind, two of them probably by injury to their fragile eyes.

A chart was exhibited showing the changes in the myopia of 80 children who had received special education over several years; the number of stationary cases seemed to show that these arrangements were of value in the control of the condition.

The next communication was by Mr. Treacher Collins and Mr. Hudson, on the pathological examination of an eye with congenital anterior staphyloma. It was illustrated by a number of slides.

Mr. Treacher Collins followed with a paper dealing with fibrous tissue formation in connection with the fibro-vascular sheath and visible vessels on the surface of the iris.

The communication was discussed by Mr. Jessop, Professor Straub (Amsterdam), and Mr. G. Coats. Mr. Collins replied.

"The Sensory Pupil Reflex in Tobacco Amblyopia." Mr. E. Arthur Dorrell said that the dilatation of the pupil obtained when the skin of any part of the body was stimulated, was either in abeyance or obtained only by increased stimuli in tobacco amblyopia.

One hundred cases were examined by him. The lowest stimuli which gave dilatation in the normal eye were obtained from 5 to 7 cells of a constant current battery, 5 cells of which gave approximately 3.5 milliampères, the negative electrode being applied to the side of the neck.

The cases were divided into three classes as follows:

Class A.—Ordinary unselected cases, showing no signs of nervous disease and not suspected of tobacco poisoning.

Class B.—Cases suspected of tobacco poisoning and showing no signs of nervous disease.

Class C.—Cases showing signs of nervous disease.



In Class A, 58 eyes were examined with the result that in 89 per cent. only 5 to 7 cells were required to produce the reflex.

In Class B, 121 eyes were examined and in only 20 per cent. was dilatation obtained with 5 to 7 cells, and in over 50 per cent. of the remaining 80 per cent. no dilatation was obtained at all, with the strongest stimulus the patient could stand.

In Class C, 18 eyes were examined and in only 22 per cent. was the reflex obtained with 5 to 7 cells and over 75 per cent. of the remainder gave no dilatation.

Owing to the similarity in the results in Classes B and C this test was not a positive sign in favor of tobacco poisoning alone, but should be included in the symptom complex of locomotor ataxia and allied affections of the spinal cord.

Friday morning was occupied with the discussion of the subject "Vascular and other Retinal Changes in association with General Disease."

Dr. James Taylor opened the discussion by referring to the wide scope of the subject and said he thought it would be impossible to discuss it fully in a manner which would be instructive. So he proposed to direct particular attention to thrombosis or embolism of retinal vessels and to raise some points in reference to other conditions embraced in the title of the discussion.

Dr. Taylor asked first as to the prognosis in albuminuric cases and referred to the short duration of certain cases and the length of life in others. He mentioned a case of albuminuric retinitis which he observed during five years before death occurred. He referred also to diabetic cases and mentioned a case in which the condition had existed during eight years, the patient being still alive. The condition of "silver wire" arteries described by Marcus Gunn was also alluded to, and a case, seen by Gunn and diagnosed by him, was mentioned, as being still alive after nine years. Dr. Taylor then referred to four cases with the ophthalmoscopic appearance of embolism of the central artery of the retina. In two of these heart changes were present; in two no such changes existed and there was no albuminuria. Reference was made to the frequent occurrence of the characteristic ophthalmoscopic appearance of embolism of the central artery in which no heart disease could be discovered. Such were probably thrombotic.

Eight cases of venous thrombosis were then described. In 7 albuminuria with a hypertrophied heart was present; in several both conditions; one is alive and in fair health after two years.

A brief reference was made to retinal hæmorrhage resulting from syphilitic disease—not a very common condition.

Dr. Taylor concluded by expressing the opinion gained from the experience which his colleagues at Moorfields had afforded him, that in most cases of venous thrombosis, cardiac hypertrophy and vascular disease are usually present. Albuminuria also may be present. In his experience venous thrombosis is not very common in glycosuric cases. The prognosis in such cases is bad, yet, exceptionally, the duration of life after venous thrombosis is much longer than one would naturally expect, and reference was made to a case seen by Mr. Morton six years ago with venous thrombosis who is still alive and well with good vision.

Mr. L. Werner (Dublin) dealt with the subject angio-sclerosis, chiefly from the clinical and ophthalmoscopic points of view. The ophthalmoscopic evidences of the disease were first considered and discussed. The necessity of an ophthalmoscopic examination in cases of suspected angio-sclerosis in general practice was emphasized and some cases were related illustrating several points of interest.

Obstruction of the retinal circulation was next treated of in connection with two cases, illustrative of different type of the disease.

The first was one of embolism of the inferior temporal branch of the central artery, occurring in a gentleman aged about 48. The upper nasal quadrant of the field of vision was suddenly lost. A white plug was seen in the affected branch of the artery, which was almost empty below it, the central vision, however, was never impaired and was still normal 15 months later. A few days after the attack, medical examination revealed the presence of a mitral valvular lesion.

Mr. Werner's second case was an unusual one of obstruction of retinal circulation in both eyes in a boy aged 11. The left eye became suddenly blind while he was at his lessons and three days afterwards the sight of the right eye went in a similar way. The ophthalmoscopic signs were those of blocking of the central artery, with breaking up of the blood column in the vessels. In the second stage the left optic disc became swollen to such a degree as to resemble a choked disc and, in both eyes, white stars of exudation developed at the macula. Perception of light was absent in the right eye for 12 days and in the left for 4, nevertheless vision improved to 6/36 in the former and to 6/24 in the latter.

The diagnosis was discussed and strong evidence brought forward to show that the disease in this case was tubercular in origin.

In conclusion the interesting subject of sudden temporary obscuration of sight was referred to. The ophthalmoscopic appearance observed during the attacks were summed up, and the cause discussed including the theory of arterial spasm.

Mr. George Coats described first the normal structure of the central artery and vein, and pointed out that in passing through the lamina cribrosa the elastic membrane of the artery breaks up into a feltwork of fine fibrils, while in the case of the vein elastic tissue disappears entirely from the wall. The normal central vein is little more than an endothelium-lined space in the tissues.

Disease of the central artery takes the form of a deposition on the inner aspect of the elastic membrane, of a new tissue composed in varying proportions of cells and fibrils, which encroach on the lumen, usually in an eccentric manner. The elastic membrane itself is often thickened, and elastic fibres are an important constituent of the new tissue. Both the cells and fibrils tend to undergo degeneration; the cells become swollen and fatty, the fibers indistinct and hyalin. Finally, by breaking down, debris-filled cavities may be formed. These changes are always greatest in outer layers of the new-formed tissue.

The primary lesion is probably a proliferation of the endothelium; in the normal central artery of a young person no other tissue is visible within the elastic membrane. The elastic tissue is probably a derivative of these proliferated cells, the case being analogous to the laying down of new layers of the membrane of Descemet by the endothelium of the anterior chamber.

Evidence of primary disease of the central vein is very rare even in cases of obstruction of that vessel. Thickening and infiltration of the wall occur, but not usually at the site of obstruction; they are therefore probably secondary, not primary and the cause of the block.

In the retinal vessels the commonest form of disease, at least in cases of obstruction of the central vein, is a thickening of the fibrous tissue of the wall. This is the same condition as is found in the central vein, but it differs from the commonest type of disease in the central artery, the change affecting the intima in the central, the media in the retinal, arteries. Endothelial proliferation is also found, but more rarely.

It is not improbable that endothelial proliferation is a response

to the stimulus of a circulating toxine, fibrosis a strengthening of the vessel wall to resist increased bloodpressure. Hence the frequency of fibrosis in the retinal vessels, which are badly supported and liable, when glaucoma is present, to be nipped at the edge of the cup.

It is probable also that endothelial proliferation is represented in the ophthalmoscopic picture by irregularities of calibre without much apparent change in the vessel wall, while fibrosis, by increasing the reflection from the wall, causes brightening of the reflex (silver wire arteries), and in more advanced stages, white lines along the vessels.

Mr. Coats also demonstrated the pathological features of some cases of obstruction of the central vein and showed that in early stages a homogeneous thrombus might be found, which subsequently undergoes invasion and organization from the surrounding connective tissues, or sometimes from the endothelium. Probably the primary cause of most of these cases is interference with the circulation due to arterio-sclerosis. Cases occur, however, in which there seems to be a true inflammatory affection of the vein wall, and this accounts for some of the instances in which young persons are attacked.

Two cases were also demonstrated which proved that not all cases of arterial obstruction are due to endarteriitis and thrombosis, but that the condition may be due to embolism.

The discussion was continued by Mr. Priestly Smith, Professor Straub, Mr. Bishop Harman, Mr. Richardson Cross (Bristol), Dr. Leighton Davies, Dr. Gray Clegg (Manchester), Mr. Whitehead (Leeds), Dr. Gordon Holmes; and the openers replied.

In the afternoon an extensive series of cases were exhibited and discussed at the Royal London Ophthalmic Hospital. During the Congress the members dined together.

OPHTHALMIC SECTION  
OF THE ST. LOUIS MEDICAL SOCIETY.

Meeting of April 2, 1913.

*Pictures of Malignant Syphilis, with Demonstration of an Adaptor for taking Stereoscopic Pictures.*—By Dr. W. H. Luedde.

The patient here presented, who has just passed through an interstitial keratitis involving both eyes, was under treatment at the same time that the case of malignant syphilis was under my observation. The contrast in the course of the disease in the two individuals was striking.

They were both young adult males, white, one aged 23, the other 26 years. The case that ended fatally showed much better physical development. Even the case record made at his admission to the City Hospital one month before his death describes his general condition as "well nourished." This statement is not entirely accurate as he went to the hospital after he had been wasting away gradually for six months previously.

The man, here present, in contrast, shows stunted growth, marked kypho-scoliosis and was the victim of a chronic psoas abscess, several years ago. No suspicion of lues existed in the mind of the family physician, but the diagnosis of tuberculosis confirmed by a von Pirquet test, in addition to the other findings when the corneal involvement first appeared in the right eye, seemed to cover everything. In this feeble individual the Wassermann test was very positive, where in the well nourished man it was feebly positive in the early stage and negative just before the fatal result. This adds another instance to the general experience showing the unreliability of the Wassermann test as a measure for the severity of lues in a given case.

In both cases the clinical diagnosis of lues was satisfactorily established. In the one syphilis was clearly a hereditary disease; in the other it may have been acquired, though no facts relating to the infection nor early symptoms could be elicited. All physical signs were lacking.

The detailed clinical history cannot be repeated in this short abstract. The fatal case first came under Dr. H. E. Miller's observation on account of a nasal sinus disease with some external swelling apparently connected with the frontal sinus. An



external operation by Drs. Miller and Schlueter showed unusually extensive necrosis, making operative relief hopeless. Vigorous specific treatment (Hg. and K.I.) which had been begun by Dr. Miller was continued. Examination of tissue sections showed "chronic inflammation." Cultures showed staphylococci, a finding taken to be of little importance in chronic processes. Increased swelling of the eyelids with subsequent sloughing brought the case under my observation. Salvarsan injections both before and after his admission to the City Hospital did not stay the progressive destruction of the tissues, bony as well as superficial. He began to show marked weakness and died at the City Hospital scarcely 8 months after the beginning of the attack. Shortly before death the Wassermann test was negative. If this can be taken as a credit to the treatment, it remains a fact that the patient died.

In the other case, while the patient had recovered with scarcely a trace remaining of his attack and has gained in weight, etc., the Wassermann test, at present, is positive, as at first after the same general treatment including one injection of salvarsan. These stereoscopic pictures of the fatal case were made with a pair of specially designed spectacle "fronts" added in front of an inexpensive Brownie Stero-kodak. This is an idea which is demonstrated here for the first time. It has practical value because it enables one to get pictures which portray special clinical processes in a more lifelike manner than ordinary photographs without the expensive apparatus hitherto required. The "fronts" consist of a pair of prisms with bases combined with convex spherical lenses of any desired strength according to the size of image desired on the films. Any oculist can make them up from his trial case by using a frame with an open cell as here shown, or, they can be ground to order by the optician. Incidentally this demonstrates the value of trial lenses with special rings referred to at the last meeting of the Section. The other stereoscopic photographs are from interesting specimens in Dr. D. L. Harris's collection at the Snodgrass Laboratory.

#### DISCUSSION.

Dr. R. Schlueter: This was an exceptionally interesting case to us, who were compelled to see it off and on during the several months and will probably never be forgotten, because many a time we held a consultation to figure as to what we could do for him, but at every step our efforts were utterly futile. In the description of the original condition, I have a somewhat different

impression than Dr. Luedde. I do not want to say mine is more correct, but he saw the case at a time after we had mutilated him. When I first saw him he had nothing externally over the region of the frontal sinus. The history which I received from Dr. Miller, when first called to his office, was that the patient had come with an inflammatory condition in his nose, extending up towards the orifices of the frontal sinus. To relieve this frontal condition, Dr. Miller had taken off a piece of the anterior portion of the middle turbinate. The bone, which he removed, as well as the soft tissue, showed necrosis. Microscopical report: Chronic inflammatory tissue. Now, before I saw him a swelling had occurred externally just below the right lower eyelid, involving the inner third. It was small at first, very small, the necrosis on the inside of his nose had extended somewhat, to what extent I could not see because we could only feel the bone. Between the skin and bone there was an area which showed that the soft tissues had loosened up from the bone. On the swelling there was a small sinus. In this we could also feel denuded bone. After cutting down and enlarging that opening in his lower lid and continuing it upward and inward as far as we could see necrosed bone, we found that bone attached very firmly. So there was no need in the face of this suppurating condition to do anything more after we found out the extent of the trouble. The necrotic soft parts were removed from the nasal surface. The nasal process of the superior maxilla was entirely denuded. A clinical diagnosis of syphilis was first made by exclusion. No other condition which we could imagine, could produce such kind of destruction. We gave him anti-syphilitic treatment and had a Wassermann reaction made. The process continued. I did not see much of him but I think there was very little change in this condition except that it steadily progressed. The process did not respect any bone sutures. These seemed to offer no impediment.

Dr. Loeb: I would like to suggest the use of dionin in the first case if it has not been used. And secondly, I would like to know if any attempt had been made to demonstrate the *spirochæte pallida* in the wound of the other case?

Dr. Higbee: I have tried dionin in corneal opacities with very indifferent success. A short time ago I had a case in which a corneal opacity appeared outside the line of injury and found that by massaging the cornea it seemed to clear up. Since then I have used massage without local medication in several cases of keratitis and have had some very gratifying results. These cases

were under internal medication which no doubt had considerably to do with the absorption of the opacities, yet I think the massage had something to do with the result, owing to the fact that they improved much faster than under treatment I had used before on similar cases.

Dr. Post: I would like to say that years ago I tried massage pretty thoroughly in haziness of the cornea, and I never saw any good result from it. I used salves with it, but was disappointed with the result of my efforts to make the cornea clearer.

Dr. Luedde, in closing: No attempt was made to demonstrate the spirochaete pallida. As Dr. Schlueter has said, anti-syphilitic treatment was given him on the clinical diagnosis of syphilis. The feeble Wassermann reaction was obtained before I saw him. We tried every available means to check the necrotic process, but our efforts, as well as those made at the City Hospital, were wasted.

In answer to Dr. Loeb's suggestion, I would say that I used dionin many years ago, watched it carefully and compared it with other cases in which it was not used. I failed to see any real advantage in dionin in cases of this kind. I know that some observers have made claims for it, but we all know that some corneal infiltrations and scars clear up much better than others. When we get good results we are likely to give credit to the method used. If we fail, we take that case to be an exception to our favorite method. The rapidity with which this case has cleared up would have added to the reputation of dionin had it been used. As it was not used, it shows how much can be done without it.

*(To be Concluded in September Number.)*

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## ABSTRACTS FROM MEDICAL LITERATURE.

By J. F. SHOEMAKER, M.D.,  
ST. LOUIS, MO.

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### SALVARSAN IN OPHTHALMOLOGY.

Garcia del Mazo (*Revista de Medicina y Cirurgia Practicas*, Dec. 21, 1912) says that recent studies show that as soon as syphilis is generalized throughout the organism all the tissues are invaded by the treponema, being found principally in the

lymphatic spaces, through which it reaches the brain and spinal cord, producing meningitis, myelitis, etc. The cerebrospinal fluid is greatly altered and as the optic nerve, the common ocular motor, the external ocular motor, and the acoustic and facial nerves are found in the base of the skull bathed in this fluid, it is natural to suppose this is the cause of the nerve disturbances. The ocular accidents must be considered as neurorecurrences, as the clinical characters do not look at all like those observed when atoxyl and arsacetin are administered, which, from the beginning are of atrophic type. A fact which shows that there are a number of ocular disturbances due to salvarsan is that we see a great number of patients with paralysis of the eye muscles and ocular disorders which are not very frequent in the first period of syphilis when only mercury is employed. The pathogenic symptoms of ocular disorders are very obscure and there are several hypotheses to explain them: 1. The slight toxic action of salvarsan upon cranial nerves shows a locus minoris resistentiæ and fixing consecutive of the syphilitic virus; 2, the treponema is hastily expelled from the cutaneous mucous tissues to the nerve centres; 3, a great number of endotoxines, which cause complications, remain free when salvarsan is used; 4, the ocular disturbances are complications of a latent disease in which salvarsan has no influence. Many authors also believe in the influence of the idiosyncrasy upon anaphylaxis, upon hypoalkalization, upon the reaction of Herscheimer, in an excess or defect of the administration of the drugs or in a fault of technic. The author reports the results of a series of cases and finishes by saying that salvarsan does not sterilize the organism; that it does not seem to be dangerous to the healthy eye, and that the results obtained in the treatment of ocular syphilis are not better than those obtained with mercury; therefore "606" must be used only when mercury is not tolerated, and a rapid action is needed.—*N. Y. Med. Jour.*